Antarctica: Intellectual Armistice Since 1961

A Monograph

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Antarctica is a 5.4 million square mile land mass, larger than the United States and Mexico combined. Covered by an ice sheet 7,000 feet thick, it constitutes 90 percent of the world's ice and 70 percent of the world's fresh water. The United States, in conjunction with 11 other nations, drafted and signed the Antarctic Treaty of 1961 to prevent the territory from becoming an object of international discord. Although Antarctica has been free of conflict for the last sixty years, the operational environment has changed. Global population growth, natural resource scarcity, and climate change are altering Antarctica's operational environment, requiring the Department of Defense (DoD), along with inter-agency and multinational partners, to develop a comprehensive Antarctic strategy that complements the Antarctica Treaty of 1961 and protects US national interests in the near term and beyond. Antarctic pursuits may be costly and risks upsetting the international balance of power, but where there is risk, there is also opportunity.

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Abstract

Antarctica: Intellectual Armistice at the School of Advanced Military Studies, by MAJ Robert M. Kinney, 41 pages.

Antarctica is a 5.4 million square mile land mass, larger than the United States and Mexico combined. Covered by an ice sheet 7,000 feet thick, it constitutes 90 percent of the world's ice and 70 percent of the world's fresh water. The United States, in conjunction with 11 other nations, drafted and signed the Antarctic Treaty of 1961 to prevent the territory from becoming an object of international discord. Although Antarctica has been free of conflict for the last sixty years, the operational environment has changed. Global population growth, natural resource scarcity, and climate change are altering Antarctica’s operational environment, requiring the Department of Defense (DoD), along with inter-agency and multinational partners, to develop a comprehensive Antarctic strategy that complements the Antarctica Treaty of 1961 and protects US national interests in the near term and beyond. Antarctic pursuits may be costly and risks upsetting the international balance of power, but where there is risk, there is also opportunity.

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Acronyms

AFRICOM	US Africa Command
ASPS	Amundsen-Scott South Pole Station
ATCM	Antarctic Treaty Consultative Meeting
ATS	Antarctic Treaty System
BAF	Bagram Air Field
BRICS	Brazil, Russia, India, China, and South Africa
CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources
CCAS	Convention for the Conservation of Antarctic Seals
CGSC	US Army Command and General Staff College
CJCS	Chairman of the Joint Chiefs of Staff
CJTF	Combined Joint Task Force
CMB	Cosmic Microwave Background
CRAMRA	Convention on the Regulation of Antarctic Mineral Resource Activities
CTF	Combined Task Force
FDO	Flexible Deterrent Options
DAF	Departmentally Aligned Forces
DC	District of Columbia
DoC	Department of Commerce
DoD	Department of Defense
DoHS	Department of Homeland Security
DoS	Department of State
DoT	Defense and Transportation
DSCA	Defense Support to Civilian Authorities
EUCOM	US European Command
FORSCOM	US Forces Command

G8	Group of Eight
G77	Group of Seventy-Seven
ICJ	International Court of Justice
IGY	International Geophysical Year
IPCC	Intergovernmental Panel on Climate Change
IWC	International Whaling Commission
JCS	Joint Chiefs of Staff
JTF-SFA	Joint Task Force Support Forces Antarctica
JP	Joint Publication
KAF	Kandahar Air Field
LOE	Lines of Effort
ME	Meetings of Experts
MGS	McMurdo Ground Station
NATO	North Atlantic Treaty Organization
NOAA	National Oceanic and Atmospheric Administration
NSDC	National Snow and Ice Data Center
NSDM	National Security Decision Memorandum
NSF	National Science Foundations
ODF	Operation Deep Freeze
PACOM	US Pacific Command
PASA	Polar Alliance of South America
PCIJ	Permanent Court of International Justice
PDD	Presidential Decision Directive
REE	Rare Earth Elements
RSOI	Reception, Staging, Onward movement, and Integration operations
SAMS	School of Advanced Military Studies

SCAR	Scientific Committee of Antarctic Research
SIDS	Small Island Developing States
SSI	Strategic Studies Institute
SOUTHCOM	US Southern Command
TF	Task Force
UK	United Kingdom
UN	United Nations
UNDEAPD	United Nations Department of Economic and Social Affairs Population Department
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
USAEAC	US Army Environmental Command
USAP	United States Antarctic Program
USGS	US Geological Service
WHO	World Health Organization

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Introduction

Antarctica is a 5.4 million square mile land mass, larger than the United States and Mexico combined.[1] Covered by an ice sheet 7,000 feet thick, it constitutes 90 percent of the world's ice and 70 percent of the world's fresh water.[2] Located 700 miles south of South America, Antarctica is considered the coldest, highest, windiest, most inaccessible place on the planet.[3] And yet, despite these harsh realities, geopolitical and scientific interest has steadily risen since the first sighting of the landmass in 1820.[4] Multiple nations, including the United States, United Kingdom, Norway, and Belgium, spent the twentieth century circumnavigating and exploring the hinterlands of the newfound continent. In 1923, the United Kingdom became the first country to formally claim sectors of Antarctica, extending administrative control to their local protectorate, New Zealand.[5] Within the next 20 years, seven total nations (United Kingdom, New Zealand, Australia, Norway, France, Chile, and Argentina) claimed 90 percent of the continent. Three territorial claims overlapped and generated friction between the United Kingdom, Chile, and Argentina (See Figure 1). Territorial claims became more sensitive as world boundaries were redrawn in the aftermath of World War II. Intensifying this global competition, the Soviet Union formally proclaimed Antarctic interest in 1950 and declared intentions to maintain an active

[1] US House of Representatives Committee on Science, Space, and Technology, "The US Antarctic Program: Achieving Fiscal and Logistical Efficiency While Supporting Sound Science," 112 Congress, Hearing Charter, (November, 2012), 2, accessed January 17, 2015, http://science.house.gov/hearing/full-committee-hearing-us-antarctic-program-achieving-fiscal-and-logistical-efficiency-while.

[2] Ibid.

[3] Howard Jack Taubenfeld, *A Treaty for Antarctica: International Conciliation, No. 531, January, 1961* (New York: Literary Licensing, LLC, 2013), 246.

[4] Frank Klotz, *America On the Ice - Antarctic Policy Issues (Sudoc d 5.402:an 8/3)* (Washington, DC: National Defense University Press, 1990), xxiii.

[5] Ibid., xxiv.

presence within the region.[6] Tensions continued to escalate, but resulted in only one minor clash between British and Argentinian sailors in 1952 at Hope Bay (tip of the Antarctic Peninsula).[7] Looking to prevent another costly conflict and contain Soviet expansion, the United States, in conjunction with 11 other nations, drafted and signed the Antarctic Treaty of 1961 to ensure peaceful practices and prevent the territory from becoming the object of international discord.[8]

Figure 1. Current Territorial Claims and Research Bases

Source. Matthew Teller, "Why Do So Many Nations Want a Piece of Antarctica?," *BBC News Magazine*, 19 June 2014, accessed March 9, 2015, http://www.bbc.com/news/magazine-27910375.

[6] Ibid., xxv.

[7] Ibid.

[8] F.M. Auburn, *Antarctic Law and Politics* (Bloomington: Indiana University Press, 1982), 298.

Although Antarctica has been free of conflict for the last 60 years, the operational environment has changed. Discoveries of mineral deposits, oil and natural gas, and commercial fisheries of krill have revealed the continent's economic potential. Advancements in technology, both terrestrial and maritime, have enhanced the feasibility of harvesting unclaimed resources in Antarctica. In addition, better cold weather equipment, modernized infrastructure, and ice-hardened boats can better sustain enduring operations located deeper within the continent. Ongoing climate change is also altering the location, mass, thickness, and uniformity of various ice sheets, opening previously inaccessible terrain and enabling the harvest of fresh water ice.[9] Although the demands for Antarctic resources have yet to be contested, the need for acquiring and controlling new quantities of natural resources (energy, food, and water) is rising due to meteoric global population growth.

Social, economic, technological, and environmental changes in the operational environment now undermine the polar norms preserved by the Antarctica Treaty. While notions of possessing Antarctica still linger, potential apportionment strategies grow less viable as international policies become more inflexible and entrenched.[10] Global population growth, natural resource scarcity, and climate change are altering Antarctica's operational environment, requiring the Department of Defense (DoD), along with inter-agency and multinational partners, to develop a comprehensive Antarctic strategy that complements the Antarctica Treaty of 1961 and protects US national interests in the near term and beyond. The belief that Antarctica can remain forever peaceful seems increasingly farcical.[11]

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[9] "Sea Ice Down Under: Antarctic Ice and Climate," National Snow & Ice Date, accessed October 11, 2014, http://nsidc.org/icelights/2012/01/11/sea-ice-down-under-antarctic-ice-and-climate/.

[10] Philip Carly Jessup, *Controls for Outer Space* (New York: Columbia University Press, 1959), 274.

[11] Philip W. Quigg, *A Pole Apart: the Emerging Issue of Antarctica* (New York: Mcgraw-Hill, 1983), 75.

Recent events in the Arctic Circle foreshadow future struggles in the Antarctica. The 2011 publication of *Russia in the Arctic*, authored by the Strategic Studies Institute (SSI), articulates the contemporary political and economic clash among five nations (the United States, Russia, Norway, Canada, and Denmark via Greenland) attempting to develop adjacent sovereign claims in newly-accessible territory.[12] The parallels to Antarctica are stark. Both poles include untapped reserves of natural resources in areas previously considered inaccessible, inhospitable, and uneconomical. However, territory at both poles are claimed by multiple nations, including three claims that geographically overlap (Chile, Argentina, and the United Kingdom).[13] Despite the twentieth-century Antarctic land rush, roughly ten percent of the continent (Pacific Ocean side) remains unclaimed (See Figure 1). The United States and Russia have compounded the confusion by reserving the right to make future claims without regard for existing territorial claims. Meanwhile, the Antarctic Treaty System (ATS) has expanded, allowing 21 additional members to directly influence current and future Antarctic policy (See Appendix – Antarctic Countries and Commitments).[14] Unlike the Arctic, where control of a polar throughway is valued, the Antarctic is considered an insignificant polar possession belonging to both everyone and no one. However, changing global conditions may increase the significance of Antarctic ownership. Enduring Antarctic action requires a detailed understanding of the past and present operational environment in order to preserve a future that may benefit both the United States and the world.

The Antarctic Treaty of 1961 is a succinct, five-page document consisting of a preamble and 14 articles outlining the collective intent for Antarctica's future. Despite the document's

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[12] Ariel Cohen, *Russia in the Arctic: Challenges to Us Energy and Geopolitics in the High North*, ed. Stephen Blank, Russia in the Arctic (Carlisle, PA: Strategic Studies Institute, 2011), 5: 30.

[13] Auburn, xvi.

[14] "Parties," Secretariat of the Antarctic Treaty, accessed October 11, 2014, http://www.ats.aq/devAS/ats_parties.aspx?lang=e.

brevity, its impact on the contemporary operational environment is far reaching and enduring. The preamble explains the mutual benefits of peace and supports the continuance of international harmony embodied in the Charter of the United Nations.[15] Article I prohibited any measures of a military nature, including the establishment of military bases and fortifications, military maneuvers, and the testing of any type of weapon.[16] Article V forbade any nuclear explosions or disposal of radioactive waste materials.[17] Article IV prevented the assertion of new territorial claims or the enlargement of existing claims in Antarctica while the Treaty remains in force.[18] Articles I, IV, and V constituted the primary assurances required for peaceful cohabitation and international collaboration.

As of 2014, 50 nations have agreed to conduct Antarctic operations under the strategic conditions codified in 1961 (See Appendix – Antarctic Countries and Commitments). Contemporary US domestic policy, crafted within the 1961 strategic framework, reinforces the commitment to the Antarctic Treaty and the subsequent international agreements. The Presidential Decision Directive 26 (PDD-26), issued by President William Jefferson Clinton in 1994, is the most recent commitment to scientific research, environmental protection, and preserving the continent as an area of perennial international cooperation.[19] However, current Antarctic strategies have oversimplified a complex environment by overlooking the increasing value of Antarctic resources, both intellectual and commercial in nature. The continued

[15] Antarctic Treaty, December 1, 1959, UST 1 (1961), 21.

[16] Ibid.

[17] Ibid., 22-23.

[18] Ibid.

[19] William J. Clinton, Presidential Decision Directive 26, "United States Policy on the Arctic and Antarctic Regions," *Federal Register* 20270 (June 9, 1994): 5.

misperception of Antarctica as having little economic or military value invites unpreparedness and potential conflict as Antarctica emerges as a colossal reservoir of exploitable raw materials.[20]

A generic understanding of Antarctica is limited at best. Numerous books have explored the history of expeditions, discovery of resources, study of science, and the landmark precedence of the 1961 Treaty. Few scholars have addressed the Antarctic problems both created and suspended by international agreements and accepted practices. The three main problems identified by F.M. Auburn's 1981 book, *Antarctic Law & Policy*, were the legality of the Antarctic treaty, the implications to national sovereignty, and the potential conflicts for natural resources.[21] Auburn expounded upon Philip W. Quigg's *A Pole Apart: Emerging Issues in Antarctica*, which initially identified the emerging political challenges as early as 1959.[22] The most recent and relevant contribution to the Antarctic discussion is Frank G. Klotz's *America on Ice: Antarctica Policy Issue* (1991).[23] Klotz articulates the potential problems associated with future wealth, the continent's strategic importance, and the indifference of US decision makers.[24] The challenges identified by Quigg, Auburn, and Klotz are unresolved and remain relevant.

Unlike the political environment, the physical environment of Antarctica is annotated in great detail through the ongoing actions of the United States Antarctic Program (USAP), which operates under the National Science Foundation (NSF). Numerous expeditions have contributed to the understanding of the climate and physical terrain in and around the continent. Similarly, the Intergovernmental Panel on Climate Change (IPCC) and the National Snow and Ice Data Center (NSIDC) have documented the impacts of climate change since 1988 and 1982 respectively.

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[20] Quigg, 183.

[21] Auburn, 298.

[22] Quigg, 75.

[23] Klotz, xv.

[24] Ibid.

Finally, the US Geological Service (USGS), the National Oceanic and Atmospheric Administration (NOAA), and the Department of Commerce (DoC) have tracked the ongoing discovery of both living and non-living natural resources. The findings of these agencies allow the global community to identify primary causal factors of change and determine future trends pertaining to the physical environment.

This monograph is divided into four sections. Section One outlines the social, economic, and environmental conditions shaping the operational environment of 1961. Section One also highlights the Antarctic Treaty System, identifies the original signatories, and evaluates initial US strategies. Section Two identifies the contemporary operational environment and the rising global interest in Antarctica. Section Two also highlights the additional 38 signatories to the Antarctic Treaty, outlines new addendums to the ATS, and describes the current US Antarctic programs and policies. Section Three identifies global population growth, natural resource scarcity, and climate change as the causal factors increasing geopolitical interest and threatening the fragility of the Antarctic status quo. Section Four offers comprehensive recommendations to modernize strategic objectives and reallocate departmental responsibilities in order to mitigate future risk and promote proactive operations in and around a region vital to US national interests. These recommendations prepare the United States to advance national interests in a future operational environment where climate change alters the viability of controlling the continent while natural resource scarcity elevates humanity's need to exploit available living and non-living resources.

Antarctic History

The prevailing notion that Antarctica should remain a continent of peaceful scientific exploration dates back to the late 1950s, in the midst of the Cold War. The International Geophysical Year (IGY) was a global scientific effort that reached across political ideologies to coordinate observations of various geophysical phenomena between July 1957 and December

1958.[25] Sixty-seven countries conducted mutually benefiting research in the Polar Regions, near the equator, and along several geographic lines joining the North Pole to South Pole.[26] Scientists were particularly interested in Antarctica, believing it was once part of a super-continent, Gondwanaland. The former super-continent once joined Antarctica to the mineral rich lands of Australia, Africa, India and South America.[27] Gondwanaland existed in the late Precambrian time, some 600 million years ago, and broke apart in the early Jurassic Period, about 180 million years ago (See Figure 2).[28] Since the continent was largely uninhabited until 1958, the region has offered the most pristine research conditions in which to observe natural phenomena. As a result, researchers have contributed to improved meteorological prediction, advances in the theoretical analysis of glaciers, and a better understanding of seismological phenomena in the Southern Hemisphere.[29] Advancements in research technologies and tools enabled scientists to further interdisciplinary research in a coordinated effort and apply their findings in a meaningful manner.[30] Although the IGY lasted only 18 months and occurred six decades ago, the ideological framework for peaceful international collaboration continues to dominate the Antarctic narrative.

[25] "International Geophysical Year," National Academy of Sciences, accessed November 4, 2014, http://www.nas.edu/history/igy.

[26] "The International Geophysical Year," National Oceanic and Atmospheric Administration, accessed November 4, 2014, http://celebrating200years.noaa.gov/magazine/igy/welcome.html#long.

[27] ANTA 501 Syndicate Report 2003 (University of Canterbury: GCAS 2003 Syndicate Report: Antarctic Resources, 2004), 8.

[28] "Gondwana," Encyclopedia Britannica, accessed February 21, 2015. http://www.britannica.com/EBchecked/topic/238402/Gondwana.

[29] "International Geophysical Year," National Academy of Sciences, accessed November 4, 2014, http://www.nas.edu/history/igy.

[30] Ibid.

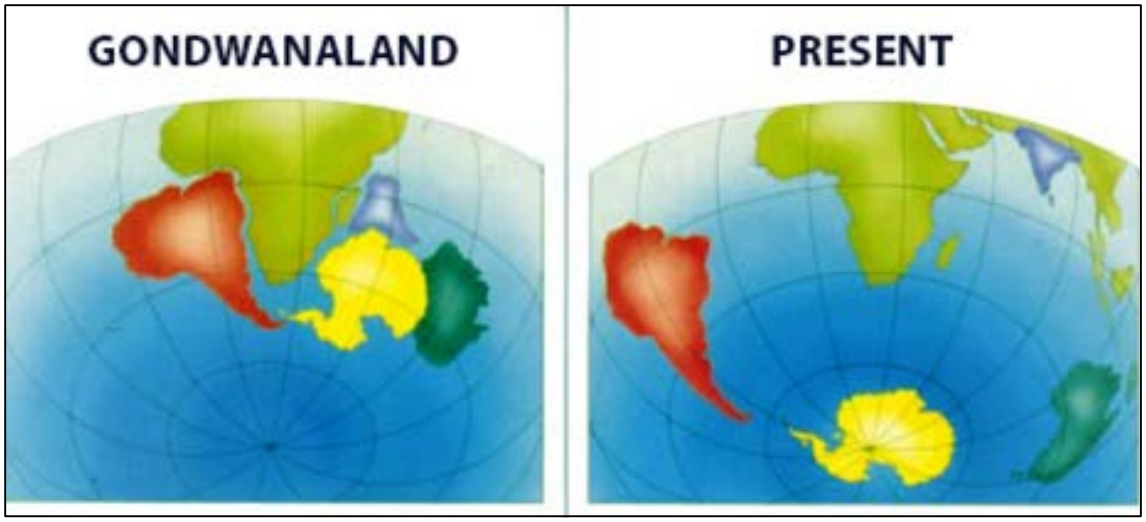

Figure 2. Gondwanaland to Present

Source. "Gondwanaland," National Science Foundation, accessed February 21, 2015. http://www.nsf.gov/geo/plr/support/gondwana.jsp.

Seeking to leverage the political goodwill fostered by the IGY in 1958, President Dwight D. Eisenhower invited 11 countries (based on contributions to the IGY) to attend a conference on Antarctic affairs.[31] Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, the Soviet Union, South Africa, and the United Kingdom accepted the President's invitation and began working on a legal framework that permitted enduring scientific partnerships by eschewing the issues of sovereign claims and territorial control.[32] Closed-door deliberations began 15 October 1958 and, seven weeks later, all parties signed the Antarctic Treaty on 1 December 1959.[33] Less than two years later, all 12 countries had ratified the Treaty (1961), ushering in a new age of unprecedented international cooperation, albeit limited to a single uninhabited continent. Although the United States quickly drafted, promoted, and adopted the international

[31] Taubenfeld, 280.

[32] Ibid.

[33] Ibid., 281.

agreement, this treaty remained specific enough to curtail conflict, while remaining general enough to adapt to social and technological changes.

Without a consensus on Antarctica's future, the continent became known as an ice-covered enigma with no near term opportunity for economic exploitation. In addition, the harsh physical environment impeded large-scale habitation, reducing the probability of Antarctic conflict.[34] However, the Soviet Union maintained numerous icebreakers and ships large enough to transport and land a division's worth of military troops.[35] Rather than matching the Soviet Union ship for ship, the United States deterred Soviet expansion by convincing them to sign the Antarctic Treaty. As long as the ATS remained a viable diplomatic framework, scientific exploration could flourish in lieu of political interests or military action.

The 1961 ATS framework served as a tool to promote global US national security objectives outlined in the 1960 National Security Council Paper 68 (NSC-68). The NSC-68 intended to develop a healthy international community while "containing" the Soviet system.[36] The Antarctic Treaty accomplished both objectives by limiting Antarctic influence to select countries and simultaneously restricting Antarctic operations to science-only activities. To this day, scientific research remains the singular line of action for an enduring presence and is the principal expression of Antarctic interest and policy.[37] Subsequent presidential documents further clarified the process, not the purpose, of supporting ongoing actions in Antarctica. In 1970, the National Security Decision Memorandum (NSDM) 71, signed under President Richard Nixon,

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[34] U.S. Congress. Senate, Committee on Committee of Foreign Relations, *The Antarctica Treaty*. 86th Cong., 2d sess., (1960. S. Doc. 57227): 38.

[35] Ibid., 26.

[36] US Department of State, National Security Council Paper 68, "United States Objectives and Programs for National Security," (April 14, 1950): 14.

[37] National Science Foundation, *U.S. Antarctic Program Participant Guide, 2014-2016*, "US Role in Antarctica," (August 1, 2014): 4.

reaffirmed the US commitment to an active and influential Antarctic presence.[38] In 1976, NSDM 318 outlined President Gerald Ford's intent to sustain Antarctic operations and codify the logistical support roles of the DoD and the Department of Transportation (DoT).[39] In 1982, President Ronald Reagan expanded DoD and DoT support to the NSF under the provisions of Presidential Memorandum 6646 to ensure sustained flexibility and operational reach into Antarctica.[40] Under this memorandum, the NSF manages the USAP and supports scientific research by overseeing a massive cooperative effort among researchers, military logisticians, and civilian agencies.[41] Twelve years later, the United States formally declared four Antarctica policy objectives expressed in PDD-26. The objectives are as follows: environmental protection, scientific research, preserving Antarctica as an area of peaceful international cooperation, and conserving living oceanic resources around the continent.[42] Although written in 1994, these policy objectives remain the legacy of the 1961 political environment and continue to influence contemporary US national strategies.

Prior to the military restrictions imposed by the Antarctic Treaty, the US Navy conducted the single largest expedition in Antarctica, Operation High Jump. In 1946-1947, Rear Admiral Richard E. Byrd led 4,000 sailors, 13 ships, two seaplane tenders, and one aircraft carrier into

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[38] Henry A. Kissinger, National Security Decision Memorandum 71, "United States Antarctic Policy and Program," (July 10, 1970): 1.

[39] Brent Scowcroft, National Security Decision Memorandum 318, "US Policy in Antarctica," (February 25, 1976): 1.

[40] Ronal Reagan, Presidential Memorandum 6646, "United States Antarctic Policy and Programs," (February 5, 1982): 2.

[41] US House of Representatives Committee on Science, Space, and Technology, "The US Antarctic Program: Achieving Fiscal and Logistical Efficiency While Supporting Sound Science," 112 Congress, Hearing Charter, (November, 2012), 2, accessed January 17, 2015, http://science.house.gov/hearing/full-committee-hearing-us-antarctic-program-achieving-fiscal-and-logistical-efficiency-while.

[42] National Science Foundation, *U.S. Antarctic Program Participant Guide, 2014-2016*, "US Role in Antarctica," (August, 2014): 4.

uncharted territory reminiscent of sixteenth-century explorers headed for America.[43] Byrd's objectives were to establish a temporary base and an air strip on the Ross Ice Shelf, explore and map the uncharted, train personnel and test equipment, and advance scientific understanding of environmental conditions.[44] The operation, having accomplished the mission in five months, demonstrated the US military's ability to mobilize and project national power throughout the entire globe. Several smaller expeditions followed Operation High Jump to refine existing maps of Antarctic territories. Of note, the Ronne Antarctic Research Expedition in 1947-48 photographed 750,000 square miles and determined new coastlines near the Weddell Sea.[45] These relatively small expeditions contributed to humanity's contemporary understanding of Antarctica's terrain and climate.

During the IGY, scientists studied Antarctic waters, ice, and weather in order to better understand the interconnectivity of global ecosystems. American scientists believed that they could not fully understand the local weather, until they established the relationship between icecaps and global weather patterns.[46] In addition, knowledge of Antarctic waters complements the international understanding of the sea since the Southern Ocean exists at the convergence of the Pacific, Atlantic, and Indian Oceans. All water is not created equal. Fresh water from lakes and rivers, or even ocean ice, is more valuable than salt water because humans depend upon potable water to sustain life. Antarctic ice is unique because it provides a global fresh water reserve as well as an archive of climate history. For millions of years, Antarctic ice has preserved

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[43] Edward Ratcliffe Garth Russell Evans Mountevans, *The Antarctic Challenged* (New York: J. de Graff, 1956), 233.

[44] US War Department, *Army Observers' Report of Operation High Jump*, Task Force 68, US Navy (Washington, DC, September 1947): 1.

[45] Finn Ronne, *Antarctic Conquest: the Story of the Ronne Expedition of 1946-1948* (New York: G. P. Putnam's Sons, 1949), vii.

[46] U.S. Congress. Senate. Committee on Committee of Foreign Relations. *The Antarctica Treaty*. 86th Cong., 2d sess., (1960. S. Doc. 57227): 75.

70 percent of the world's fresh water supply as well as invaluable information pertaining to climate history. These snapshots of air and soil sediments await further scientific exploration. Without the need to exploit fresh water reserves from an uninhabited continent 7,000 miles away from the United States, scientific data remained the only relevant Antarctic export.[47]

Despite the IGY environmental focus, considerations for living and non-living natural resources garnered little attention during the 1961 Antarctic Treaty ratification hearings. Dr. Laurence Gould, a leading US geologist who accompanied Admiral Byrd on his 1957 Antarctic expedition, stated he "would not give a nickel for all the mineral resources he knew of in Antarctica."[48] This opinion received heavy consideration by the US Senate Committee on Foreign Relations because so few people had visited Antarctica. Congress's desire to expedite ratification led to the dismissal of dissenting opinions. The extreme physical environment limited the exploitation and transportation of natural resources to commercial markets and therefore minimal discussion ensued on the potential for future extraction.[49]

Offshore prospecting and oil drilling were relatively new concepts in 1947. Technical developments began in the shallow waters of the California coastline, where the water measured no more than 20 feet deep.[50] The challenges discovered during offshore drilling in California did not encourage polar operations since the Antarctic shelf is almost 800 feet deep and riddled with loose icebergs tumbling across the ocean floor. Therefore, the technocrats and visionaries of 1961 focused their innovations elsewhere. Only through continued exploration, or global crisis, could

[47] Ibid.

[48] Ibid., 75.

[49] Ibid., 46.

[50] "Offshore Petroleum History," American Oil & Gas History Society, accessed 14 November, 2014, http://aoghs.org/offshore-history/offshore-oil-history.

Antarctica be considered a cornucopia of unexploited resources.[51] There is no question that minerals exist in Antarctica, but rather, if they can be extracted on economic, social, and political grounds.[52] Due to high operating costs and low returns on academic investments, the scientific community remained free to explore, experiment, and self-regulate the Antarctic region.

History demonstrates that exploration tends to evolve into a process of exploitation. The North American Buffalo and the Siberian Tiger faced near extinction after being hunted for reasons ranging from anthropological survival to cultural ornamentation. The Antarctic continent is no different. Seals and whales have been harvested in droves since the early twentieth-century.[53] Unlike land-based species, the impacts to seaborne species are less observable and therefore much more difficult to mount a case for protective status. In lieu of known long-term environmental impacts, the decision to halt the exploitation of aquatic animals relies upon known short-term economic factors. For instance, whalers in the 1930-1931 whaling season captured, killed, and processed over 37,500 whales by factory ships resulting in record revenues.[54] Although the long term impacts were unknown, some form of control was required to prevent undue harm to current and future fisheries. Regardless, these issues were tabled in fear of jeopardizing the productivity of the Antarctic Treaty conferences. Policymakers felt inclined to establish a recognized international framework in which to handle issues and concerns, rather than relying upon a perpetual ad hoc consortium. For better or worse, these decisions continue to shape our current understanding and future actions in Antarctica.

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[51] U.S. Congress. Senate. Committee on Committee of Foreign Relations. *The Antarctica Treaty*. 86th Cong., 2d sess., (1960. S. Doc. 57227): 11.

[52] ANTA 501 Syndicate Report 2003, 8.

[53] Ibid., 3.

[54] Ibid., 4.

Antarctic Policies and Programs

Since 1959, 38 additional countries have become ATS members by demonstrating an enduring interest in Antarctica through "substantial research activity there (See Appendix – Antarctic Countries and Commitments)."[55] In order to become a consultative member to the ATS, nations must contribute men, materials, or money to ongoing or proposed scientific and expeditionary operations on or around the continent. The ATS now includes 50 members: 29 consultative members (decision makers) and 21 non-consultative members (influencers). The most notable ATS consultative additions are China, India, Brazil, Germany, and Italy. Both Canada and Denmark have ratified the Antarctic Treaty, but have not received ATS consultative status. The additions are significant as each new member represents new and diverse individual and collective interests exercised through the ATS. For example, Antarctic politics reflect the diverse interests of the Arctic nations, the Group of Eight (G8), and the North Atlantic Treaty Organization (NATO). In addition, the Brazil-India-Russia-China-South Africa (BRICS) alliance is fully represented as ATS consultative members. Future authorities and operations in Antarctica will most likely reflect the agreements and non-agreements of these collective bodies.

Since the initial Antarctic Conferences in 1959, the ATS has sponsored 79 meetings ranging from full Antarctic Treaty Consultative Meetings (ATCM) to event specific Meetings of Experts (ME).[56] ME topics have included telecommunication improvements, logistical support, air safety, shipping, tourism, environmental monitoring techniques, and climate change. These meetings aimed to garner efficiencies across multiple state-sponsored operations for mutual benefits in pursuit of promoting scientific knowledge and understanding. The ATCMs focus on achieving diplomatic agreements regulating the time, space, and purpose associated with any and

[55] "Parties," Secretariat of the Antarctic Treaty, accessed October 11, 2014, http://www.ats.aq/devAS/ats_parties.aspx?lang=e.

[56] "Meetings," Secretariat of the Antarctic Treaty, accessed March 05, 2015, http://www.ats.aq/devAS/ats_meetings.aspx?lang=e.

all activities south of the 60th Parallel. The most notable agreements are the empowerment of the Scientific Committee on Antarctic Research (SCAR), the 1972 Convention for the Conservation of Antarctic Seals (CCAS), the 1980 Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR), and the Environment Protocol in 1998. However, no ATS member ratified the Convention on the Regulation of Antarctic Mineral Resource Activities (CRAMRA), which began in 1982 and concluded in 1988. The relative importance of each agreement and non-agreement is detailed below.

In 1958, the newly-established SCAR synchronized planning and preparations for the IGY. Through the ATS, the SCAR has expanded its territorial influence to the Southern Ocean and surrounding island chains.[57] As the first line enforcer of Antarctic policy, the SCAR provides independent scientific advice to the ATCM, the United Nations Framework Convention on Climate Change (UNFCCC), and the IPCC concerning the management and role of Antarctica within local and global ecosystems. The SCAR regularly updated the UN General Assembly on Antarctic Affairs from 1983 until 2006 when the matters of Antarctica were of relatively low risk as compared to emerging global concerns in Africa and the Middle East. Today, the SCAR serves as the global clearing house for all Antarctic operations and provides annual reports to the Antarctic Treaty Secretariat in Buenos Aires.[58] The Secretariat ensures all scientific operations are conducted in compliance with the CCAS, CCAMLR, and the EP.

The CCAS, developed in 1972, aimed to codify the protection, study, and rational use of Antarctic Seals while safeguarding the delicate balance of regional and global ecosystems. To do so, the CCAS expanded the protection for seals ranging from the Antarctic land mass and ice

[57] "About SCAR," Scientific Committee on Antarctic Research, accessed November 14, 2014, http://www.scar.org/about-us.

[58] Ibid.

pack into the high seas south of the 60th parallel.[59] The high seas constitute an open ocean and do not fall within any country's jurisdiction. Because no single country exercises sovereignty within the Antarctic, the ATS extended their regulatory power to the SCAR. The SCAR determines seasonal quotas for seal utilization and monitors compliance through self-reporting. Although most countries generally operate within the scope of the SCAR recommendations, only sixteen of the fifty ATS members have ratified the CCAS. The most notable absence from the CCAS agreement was New Zealand, the only original signatory of the treaty not to ratify it. New Zealand did not ratify this agreement because it argued that establishing an enforcement mechanism was premature and that unofficial means of curtailing seal exploitation would naturally evolve over time.[60] However, New Zealand and the other 13 non-ratifying consultative members still maintain their consultative status within the ATS. The lack of unity among the ATS members, to include the consultative members, poses a significant question. How can the ATS write and enforce international policy applying to all states if those new policies are not ratified by its own decision making body?

The CCAMLR, developed in 1980 and enforced in 1982, aimed to track and regulate the use of Antarctic marine living resources, specifically krill, in order to prevent over harvesting. The term “living resources” refers to populations of fin fish, mollusks, crustaceans, and all other species of marine life to include birds. The preamble of the CCAMLR identifies these living resources as a viable reservoir of protein that, if overexploited, could potentially jeopardize the status quo, environmentally and diplomatically. Technological advances in maritime equipment have allowed ice-hardened boats with bigger holding tanks to operate longer in Antarctic waters. The increased capacity to deplete existing stocks at a rate faster than natural regeneration posed a

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[59] *Convention for the Conservation of Antarctic Seals*, February 11, 1972, UST 441 (1978), 89.

[60] *Report of the Conference on the Conservation of Antarctic Seals in London*, February 3-11, 1972 (United Kingdom: Foreign and Commonwealth Office, 1972), 18.

serious concern to the ATS. Therefore, the CCAMLR appointed the SCAR as the regulatory entity to limit the quantities of living resources harvested and also determine harvest areas and seasons. The formal and informal enforcement of research, monitoring, and conservation practices within the convention areas have made a valuable contribution to global food security.[61] The CCAMLR continues to regulate all living resources with the exception of whales, which remain the responsibility of the International Whaling Commission. The policies and practices of both commissions are mutually supporting. Despite the global benefits of ensuring stable ecosystems, only 30 of the 50 ATS members have ratified the convention. The fact that 20 members, two of them consultative, have yet to join is troubling.[62]

Even more troubling than the trend of non-consensus was the unanimous decision by the ATS members to scuttle the conventions on mineral resources regulation. In 1982, the consultative members identified the need to preemptively regulate these activities in order to mitigate the inherent environmental consequences. Although the Antarctic Treaty protected the scientific exploration of minerals, the methods, practices, and procedures to do so were virtually indistinguishable from those used in prospecting.[63] To clarify the difference and strengthen international oversight, the CRAMRA limited all mineral activities by empowering the SCAR to regulate and arbitrate specific times and locations for mineral-related activities. Discussions over minerals reinvigorated once dormant political issues of sovereignty and territorial claims in Antarctica. The seven claimants, who were once obliged to suspend their territorial ownerships in pursuit of scientific riches, opposed denying themselves of economic riches. Without the unified

[61] "About CCAMLR," Commission for the Conservation of Antarctic Marine Living Resources, accessed November 4, 2014, https://www.ccamlr.org/en/organisation/about-ccamlr.

[62] "Parties," Secretariat of the Antarctic Treaty, accessed October 11, 2014, http://www.ats.aq/devAS/ats_parties.aspx?lang=e.

[63] "Regulation of Antarctic Mineral Resource Activities," *Handbook of the Antarctic Treaty System*, Department of State, (August, 2002): 385.

support of the twelve original signatories, including the seven claimants, the CRAMRA died on the vine. By 1988, it became clear that this agreement would never happen.[64] Although the CRAMRA indecision disappointed scientists and statesmen, the failure laid the groundwork for a less binding resolution which the ATS passed unanimously in 1998.

The Protocol on Environmental Protection to the Antarctic Treaty (EP) was drafted in 1991 and entered into force in 1998. The EP reaffirms Antarctica as a natural reserve and prohibits all non-scientific mineral related activities until 2048.[65] Furthermore, the prohibition on mineral resource activities remains in effect until a replacement agreement on Antarctic mineral resource activities is in force.[66] In addition, the EP can only be modified by a unanimous agreement of all consultative members to the Antarctic Treaty, which is unlikely based upon growing membership and aversion to binding resolutions. Although the EP seemed more restrictive than the CCAS and the CCAMLR, it included one special provision that empowered each potential signatory. The Environmental Protocols established a committee, composed exclusively of consultative members, empowered to determine the difference between exploration and exploitation of resources.[67] In carrying out its functions, the committee may consult with any relevant scientific, environmental, and technical organizations, but the power to decide and enforce is exclusive to the committee. The states which were not currently consultative members still possessed the opportunity to receive decision making status through continued operations in the Antarctic. The additional power, or path to power, through the SCAR, granted by the Environmental Protocols, encouraged unanimous support and immediate implementation.

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[64] Ibid.

[65] *Protocol on Environmental Protection to the Antarctic Treaty*, January 14, 1998, UST 4 (1998), 48.

[66] Ibid.

[67] Ibid., 41.

The United States supports the SCAR through the USAP. The USAP is the execution arm of the Office of Polar Affairs, funded by the NSF and supported by multiple US departments. As of last year, the USAP reported 99 independent research endeavors of varying scope in and around Antarctica.[68] Domestic policies influencing the USAP have nominally evolved since 1960. The PDD-26, the Presidential Memorandum 6646, and the NSC-68 reaffirm the singular commitment to open exploration and pursuit of scientific knowledge in Antarctica. Due to the limited guidance provided by these domestic policies, the NSF is free to direct the USAP as desired. The USAP establishes the scientific agenda and requisite support mechanisms administered by the DoD and DoHS while enabling DoS participation in numerous international venues. The operational reach of the USAP has been significantly extended over the last fifty years through military logistical support. For example, the 2014-2015 Field Season in Antarctica began in September of 2014, enabling researchers to work on dozens of projects ranging from underwater seal navigation to drilling ice cores at the South Pole to uncover global climate history.[69] Today, researches can work deeper within the continent at longer intervals due to improved infrastructure and continual support at the McMurdo Ground Station (MGS), the Amundsen-Scott South Pole Station (ASPS), and the Palmer Station. Although the USAP's scientific reach has expanded, the DoD's ability to rapidly respond to continental conflict remains limited by the Antarctic treaty. Should armed conflict break out on the ice, the USAP is unqualified to defend US national interests or protect the MGS, the ASPS, or Palmer Station.

The US military's role in Antarctica has devolved into pure logistics. Currently, Operation Deep Freeze (ODF) is an enduring joint service activity known as the Joint Task Force

[68] "US National Report to SCAR for Year: 2013-2014," National Academies Polar Research Board, (2014), 12-17.

[69] "New Chapter Begins," United States Antarctic Program, accessed November 21, 2014, http://antarcticsun.usap.gov/features/contenthandler.cfm?id=4078.

Support Forces Antarctica (JTF SFA), providing year round direct support to NSF and USAP.[70] The first ODF occurred in 1954-1959 under the command of Rear Admiral George J. Dufek. It established logistical support infrastructure in preparation for the IGY 1957-58.[71] Since the first ODF, the roles and responsibilities of the DoD, and specifically US Pacific Command (PACOM), have remained relatively unchanged. In fact, Antarctic wasn't even assigned to the PACOM area of responsibility until 2002.[72] The US military ensures that all personnel living and working at one of the three US stations can withstand harsh and lethal conditions. Although the United States demonstrated the capability to project Antarctic military power in 1947, international regulation and domestic restraint has limited the scope of enduring military operations in favor of scientific pursuits.

The MGS supports Antarctic operations in the same way Kandahar Air Field (KAF) or Bagram Air Field (BAF) supported the Afghanistan area of operations. The MGS, located on Ross Island, enables 1,100 personnel to research numerous scientific disciplines and serves as the logistical support hub for most international stations. It boasts a deep water port and a C-130 capable airstrip.[73] Due to the size and location of MGS, it serves as the logical point of reception, staging, onward movement, and integration operations (RSOI) for most exploratory field work in East and West Antarctica. The MGS is home to many scientific disciplines, including astrophysics, biology and ecology, glaciology and geology, integrated system science, ocean and

[70] National Science Foundation, *U.S. Antarctic Program Participant Guide, 2014-2016*, "US Role in Antarctica," (August, 2014): 4.

[71] George John Dufek, *Operation Deepfreeze* (New York: Harcourt, Brace, 1957), 3.

[72] Department of Defense, "Unified Command Plan 2002 with Change 1 and 2," MCM-0016-03, Washington, DC (February 2003), 10.

[73] "Personnel, Camps, and Stations," National Science Foundation, accessed October 11, 2014, http://www.nsf.gov/geo/plr/antarct/treaty/opp10001/big_print_0910/bigprint0910_5.jsp.

atmospheric sciences, and earth sciences.[74] Although the facility dates back to the IGY, the infrastructure has been modernized to include a power plant, fire station, potable water plant, limited retail stores, dormitories, and administrative and science buildings.[75] These ice hardened permanent structures are connected by a robust network of above-ground electrical and water lines capable of withstanding 100 mph winds and severe weather. As the lifeline that sustains all other US stations throughout the continent, MGS is the single most important Antarctic station.

The ASPS, located at the geographic South Pole, supports work in astronomy, astrophysics, meteorology, and climate studies.[76] With 60 to 240 personnel, the ASPS is also internationally and politically vital since it enables an American presence at the convergence of six of the seven territorial claims.[77] Occupants of the South Pole, especially the limited number who winter over, have internalized the South Pole as the de facto capital of Antarctica. The idea of occupying the capital has propelled both science and conquest. Although the claims to territories and symbolic capitals were ultimately suspended by the Antarctic Treaty in 1961, the South Pole still provides scientific and diplomatic leverage within the SCAR and ATS respectively. Due to the extreme winter at the ASPS, the majority of scientists head to MGS for the winter or return to their home country until the next summer season. However, due to the political importance of maintaining a physical presence, an American has occupied the geographic South Pole continuously since November 1956.[78]

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[74] "McMurdo Station Webcams," United States Antarctic Program, accessed November 21, 2014, http://www.usap.gov/videoclipsandmaps/mcmwebcam.cfm.

[75] Ibid.

[76] Ibid.

[77] Klotz, 171.

[78] "Amundsen-Scott South Pole Station," National Science Foundation, accessed November 21, 2014, http://www.nsf.gov/geo/plr/support/southp.jsp.

The Palmer Station, located on Anvers Island, is named after American Nathaniel B. Palmer, who first recorded sighting Antarctica in 1820. Of the three US stations, the Palmer station is the only one constructed after the ratification of the Antarctic Treaty and outside the Antarctic Circle. From 1965 to 1970, the USAP constructed a large permanent station with modernized biology laboratories in order to focus on marine biology due to its relatively warm temperatures (14-36^{o} Fahrenheit). The Palmer Station facilitates the marine research of krill, which may one day offer a major source of protein for human consumption.[79] Today, two main buildings and several smaller structures comprise the Palmer Station and provide housing and research facilities for 40 plus scientists and support personnel.[80] While the size and scope of the Palmer station is limited, the diplomatic importance is substantial. The Palmer Station is strategically located within the area claimed by the United Kingdom, Chile, and Argentina. Pending a scientific breakthrough or discovery of commercial quality fisheries, territorial claims may cause conflict as nations seek to exploit newly valued resources. An American presence serves as a flexible deterrent option (FDO) to preemptively pacify an area already fought over during the 1952 conflict at Hope Bay.

Antarctic Potential

Global interest in Antarctica has steadily risen over the last sixty years. The ATS and SCAR have grown from twelve nations to 50 and 38 members respectively. While the SCAR has always provided scientific advice to the ATCMs, the SCAR has expanded its influence to other global organizations, most notably the United Nations Framework Convention on Climate

[79] "Personnel, Camps, and Stations," National Science Foundation, accessed October 11, 2014, http://www.nsf.gov/geo/plr/antarct/treaty/opp10001/big_print_0910/bigprint0910_5.jsp.

[80] "Palmer Station Webcams," United States Antarctic Program, accessed November 21, 2014, http://www.usap.gov/videoclipsandmaps/palwebcam.cfm.

Change (UNFCCC) and the IPCC.[81] These SCAR reports have demonstrated the scholarly contributions of Antarctic scientific study. However, such contributions often spur into political, military, or economic action when capability and necessity converge. Sensitive to this natural evolution of intent, 77 developing nations banded together in 1964 to form the Group of 77 (G77) in order to demand a voice in the Antarctic conversation, independent of ATS preconditions. Since 1964, the G77 has expanded to 130 nations and serves as the economic counterpart of the nonaligned countries in order to devise a "New Economic World Order."[82] What factors prevent the ATS and the G77 from reconciling the administration and distribution of potential Antarctic wealth? The answers lie in the disparity between the global and regional effects of population growth, resource scarcity, and climate change. Much like latitudes and longitudes on a globe, these factors converge at the South Pole.

Today, the three Antarctic living resources with economic potential are krill, finfish, and whales. Although krill is the smallest in size, it has the largest economic upside because of its suitability for large-scale human consumption. It is also the key prey for many animals, including seals, seabirds, squid, fish, and whales. Overharvesting krill would have irrevocable short-term and long-term ecological effects. Japan and Russia already harvest large quantities of krill as evidenced by their local grocers carrying these items as part of their regular stock.[83] The Soviet Union began large-scale commercial fishing in 1967.[84] By 1995, ten additional nations harvested

[81] "Policy Advice," Scientific Committee for Antarctic Research, accessed November 25, 2014, http://www.scar.org/policy-advice.

[82] Karl Sauvant, "The Group of 77. Evolution, Structure, Organization," *American Journal of International Law* 77, no. 1 (January 1983): 192-93.

[83] "Why Krill?," National Oceanic and Atmospheric Administration, accessed November 20, 2014, https://swfsc.noaa.gov/textblock.aspx?Division=AERD&id=11462.

[84] "Antarctica Past and Present", National Science Foundation, accessed November 20, 2014, http://www.nsf.gov/pubs/1997/antpanel/4past.htm.

mass quantities of krill and finfish in and around the Antarctic Circle.[85] Although the CCAMLR established catch limits, the impacts of continual harvesting are yet to be observed due to the relatively immature understanding of the Antarctic ecosystem.

Despite the impacts of over fishing krill and finfish, the most visible and divisive fishing practice in Antarctica is whaling. For this reason, the International Whaling Commission (IWC), consisting of 41 ATS members, declared Antarctic waters a whale sanctuary in 1994, effectively forbidding commercial whaling south of the 60th parallel.[86] Due to the ATS declaration, Japan, Iceland, and Norway officially relocated commercial whaling practices north of the 60th parallel. However, the International Court of Justice (IJC) reviewed Japanese whaling practices in Antarctica and found Japan in violation of these agreements as recently as March of 2014.[87] The case is under appeal, and Japanese whalers continue operations while the international community waits for the conclusion of international due process.

Unlike the high profile nature of whaling, the current disposition and location of non-living resources like minerals, oil, and gas are lesser known. This lack of knowledge is due to Article 7 of the Environmental Protocols, which strictly forbade mineral prospecting.[88] Since the SCAR does not require mineral specific reports from scientific exploration, information is heavily safeguarded. In addition, the technology required to safely remove nonliving resources presents environmental liabilities too great at the present time. For instance, the British petroleum oil spill in the Gulf of Mexico remained localized to the gulf. A spill of that magnitude in the Southern Ocean would have irreparable global effects due to the inability to contain the oil. The Southern

[85] Ibid.

[86] Ibid.

[87] Whaling in the Antarctic (Australia v. Japan: New Zealand Intervening), International Court of Justice, Judgment dated March 31, 2014, 2.

[88] Protocol on Environmental Protection to the Antarctic Treaty, January 14, 1998, UST 4 (1998), 39.

Ocean is connected to and responsible for the salinization of the Indian, Atlantic, and Pacific Oceans. Once technological and political conditions reduce the liabilities associated with Antarctic mineral extraction, interest and innovation within the Antarctic will rise sharply.

Due to technological limitations and environmental liabilities associated with oil extraction, the most abundant and readily available Antarctic resource is ice. The uses for ice are self-evident and yet ice harvesting remains troublesome. In 1977, the First International Conference and Workshops on Iceberg Utilization convened in Iowa. The conference discussed potential usage for fresh water production, weather modification, and other applications.[89] Over 100 scientists from around the globe met at Iowa State University to address selection and transportation of icebergs, environmental impacts, and the overall viability of augmenting the world's fresh water supply. Although no substantial decisions emerged from the conference, the concept that icebergs constituted a viable source of drinking or irrigation water was no longer ignored.[90] The same contemporary challenges that impact mineral extraction apply to iceberg utilization. Current technologies cannot prevent excessive melting during transportation, nor does legislation exist to mitigate any liabilities incurred from errant icebergs running aground on sovereign soil. These gaps in iceberg technology and legislative protections are likely to remain until potable water shortage emerges as a global threat.

Changes in climate and weather patterns may soon alter the access to and demand for known resources like water, oil, and marine life. In addition, global climate change has started to create regional resource shortages, which global population growth compound. Global climate change is just now being understood and the long terms impacts are the source of much intellectual debate. In 2013, the IPCC published their Fifth assessment report. The IPCC provides

[89] "International Conference and Workshops on Iceberg Utilization for Fresh Water Production, Weather Modification, and Other Applications," Iowa State University, accessed November 20, 2014, http://www.add.lib.iastate.edu/spcl/arch/rgrp/0-4-4.html.

[90] Quigg, 104.

a clear and unbiased scientific view of climate change and its potential environmental and socio-economic impacts.[91] The report stated that "the atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased."[92] These changes continue to alter the Antarctic ice shelves and surrounding ice packs, leading to greater instability along the Antarctic peripheries. In addition, regional trends in ocean salinity provide indirect evidence that evaporation and precipitation over the oceans have changed.[93] As the global environment impacts the Southern Ocean, the Antarctica landscape is simultaneously expanding and restricting access to contemporary scientific exploration and prospecting for natural resources. Even with a nominal human presence in Antarctica, the continent encompasses 14 million square miles (1.5 times the size of the United States) and is by no means under any single nation's control.[94]

Although Antarctica is relatively uninhabited, global populations continue to rise. The United Nations Department of Economic and Social Affairs Population Department (UNDEAPD) predict that the global population will increase from 7.1 billion in 2013 to 9.5 billion in 2050.[95] The most interesting note, and cause for concern, is the disparity of increase between developing and developed countries. For instance, 2.3 of the 2.4 billion projected are associated with

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[91] "Organization," Intergovernmental Panel on Climate Change, accessed 23 February, 2015. http://www.ipcc.ch/organization/organization.shtml.

[92] Intergovernmental Panel for Climate Change, 2013: Summary for Policymakers. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, (Cambridge University Press, NY, USA) 4.

[93] Ibid., 8.

[94] "Antarctica," World Factbook, accessed October 11, 2014, https://www.cia.gov/library/publications/the-world-factbook/geos/ay.html.

[95] *World Population 2012* (United Nations Department of Economic and Social Affairs Population Department, 2012), accessed November 25, 2014, http://www.un.org/en/development/desa/population/publications/pdf/trends/WPP2012_Wallchart.pdf.

developing countries (including China), which are generally represented by the G77. Population growth will increase natural resource consumption. Governments' ability to provide those resources will undoubtedly influence a country's legitimacy and solvency. States may be forced to look outward to mitigate the effects of growing populations. If population forecasts are remotely accurate, impacts to developing nations will require a global response. Unless internal supply or external access to resources grows comparable to population growth, regional disparities could drive conflict from pole to pole.

Exploration and exploitation of natural resources are typical means to offset consumption, or more specifically, the relative depletion compared to population growth. As populations increase, the quantity of resources per capita is diminished. The British Empires, French Republics, United States, Soviet Union, and Chinese Dynasties have all expanded territories by the pen or sword in order to meet the demands of growing populations and economic enterprise. Antarctica may emerge as the global reserve of minerals, oil, gas, and fresh water once all other lands are consumed. For example, China controls 95% of the rare earth elements (REE) needed to manufacture modern technologies.[96] As of 2010, the United States obtains its REE almost exclusively from China.[97] Although current technologies do not support the exploitation of Antarctic minerals, prospecting and scientific research hopes to one day close the gap and provide an alternate supply source. Technological limitations and liability concerns also deter the drilling of oil and gas in Antarctica. Similar limitations have deterred the cultivation of icebergs to solve drinking and irrigation water concerns, despite the growing need to provide new sources of potable water. Since Antarctic natural resources are technically unclaimed and

[96] US Geological Survey, *Scientific Investigations Report 2010*, "The Principal Rare Earth Element Deposits of the United States: A Summary of Domestic Deposits and a Global Perspective", 23.

[97] Ibid., 4.

physically undefended, Antarctica may attract more interest as new technologies empower new ventures at relatively low risk and high reward.

Technological advancements have enabled deeper sustained operations in previously inaccessible areas. Eighteen countries operate eighty icebreaker ships capable of operating at either pole.[98] The global fleet of ice breakers is expanding and expected to reach nearly 100 ships in the next 10 years, over half of which will belong to the Russian Federation.[99] Of the eighteen nations with icebreakers, seventeen are members of the ATS, while four members are also affiliated with the G77 or BRICS. Year round access in and around the Antarctic continent is irregularly available regardless of international affiliation or scientific intent. In addition, advances in cold weather drilling techniques, influenced by various space expeditions, enabled deeper penetrations into the Antarctic core. For example, the Lunar Vader drill is a 1 meter class drill and cuttings acquisition system enabling subsurface exploration of the Moon.[100] Although a depth of 1 meter is not significant, the fact that the drill was remotely operated from California, some 8000 miles away, demonstrated a future potential for remote exploration and exploitation.[101]

Antarctic sea ice has increased on average 1.5% per decade between 1979 and 2012 and yet, due to the size of Antarctica, there are strong regional variations with increases in some areas and decreases in others.[102] The lack of uniformity poses unique problems to the Antarctic

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[98] "Major Icebreakers of the World Chart," USCG, accessed November 26, 2014, http://www.uscg.mil/hq/cg5/cg552/images/20140626%20Major%20Icebreaker%20Chart.pdf.

[99] Ibid.

[100] K. Zacny et al., "Lunar Vader," *Journal of Aerospace Engineering* (January 2013): 74.

[101] Ibid., 86.

[102] Intergovernmental Panel for Climate Change, 2014. *IPCC Fifth Assessment Synthesis Report*, 2, accessed November 26, 2014, http://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_LONGERREPORT.pdf.

landscape. As sea-ice extant and glaciers expand and contract, the structural integrity of the ice mass is stressed and prone to calving. Calving is a violent process in which giant chunks of ice break away to form icebergs resulting in large waves, floating obstacles, and increased water levels.[103] Since 1950, extreme changes in weather and climate have expedited the calving process.[104] The regional and global impacts of these glacial entities demonstrate the contemporary effects of climate change on multiple operational environments. In particular, the creation and destruction of icebergs and sea ice disrupts Antarctica's role in producing bottom water, which is vital to the salinization of the ocean. The salt rejected during the freezing process creates cold dense water which sinks to the ocean bottom, dispersing through underwater currents to surrounding oceans.[105] Seemingly minor disturbances in the Antarctic region have global impacts due to the centrality of the Southern Ocean to the Pacific, Atlantic, and Indian Oceans.

The world's climate shares a symbiotic relationship with all living organisms, particularly humans. As global populations increase, humanity's influence will expedite rising climates.[106] Since the climate shapes human interaction and human actions shape the environment, they can never be considered independently in time or space. While the specific anthropogenic causes of climate change are beyond the scope of the monograph, the impact of climate change will likely influence the future operating environment in Antarctica. New technologies could one day mitigate the effects of runaway ice by transporting this scarce natural resource (drinking water) to a region struggling to support a growing population. Water shortages might drive the international community to collectively or unilaterally seek Antarctic-based alternatives to fresh water security.

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[103] "Glaciers," National Geographic, accessed November 26, 2014, http://education.nationalgeographic.com/education/encyclopedia/glacier/?ar_a=1.

[104] *IPCC Fifth Assessment Synthesis Report*, 7.

[105] "Calving of Mertz Glacier and Its Impacts," Antarctic Climate & Ecosystems, accessed November 26, 2014, http://www.acecrc.org.au/access/cms/news/?id=11&full=true.

[106] *IPCC Fifth Assessment Synthesis Report*, 1.

The impending effects of climate change, global population growth, and resources scarcity are altering the contemporary value of Antarctica. However, current Antarctic strategies and policies remain bound to the intellectual framework and conceptual understanding of 1961.

Antarctic Futures

Since the 1960s, the scientific programs in Antarctica have cultivated international cooperation and good faith. This ongoing amity serves as the basis for current US national military strategies and remains adequate for today's operational environment. However, Antarctica's future operational environment will be impacted by changing climates, soaring global populations, and expiring international agreements. In particular, regional demands for water in Africa are likely to exceed local capacity based upon recognized 2060 projections of climate change and global population growth. African states will be forced to seek external alternatives. Furthermore, the Environmental Protocols, which guard against Antarctic natural resource exploitation, expire in 2048.[107] Without an Antarctic military presence to defend global fresh water reserves, resources may be exploited by any nation with polar motives and capabilities.

By 2060, climate change will have intensified the variance of normal weather patterns, making wet areas wetter and dry areas drier.[108] African deserts grow due to extended droughts while tropical rain forests receive more precipitation due to periodic yet, intensive precipitation.[109] By 2040, ice within the Arctic Circle will have sufficiently receded to support extended use of the Northwest Passage while Antarctic ice will vary regionally at uneven and

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[107] *Protocol on Environmental Protection to the Antarctic Treaty*, January 14, 1998, UST 4 (1998), 48.

[108] *IPCC Fifth Assessment Synthesis Report*, 1.

[109] Ibid., 7.

competing rates.[110] For instance, the western ice sheet will melt into the Pacific Ocean while the Eastern ice sheet grows outward into the Indian Ocean.[111] Projected Antarctic ice melting rates predict the sea level will rise by 21 millimeters from 2014 to 2060.[112] The global population will have increased by 2.4 billion, where 50 percent of the growth will occur within the African continent.[113] Although most developed states will remain capable of sustaining their increased population sizes, the resilience of undeveloped African countries will be tested. Scarcity of drinking water will become a regional epidemic with global implications. Lack of desalinization infrastructure, stemming from relatively low economic returns on investment, will prevent ocean water from augmenting the lack of fresh drinking water. As water demand and availability become more uncertain, all societies will be more vulnerable to inadequate water supply.[114] Regional instabilities will deteriorate into civil wars as each state and their subordinate social groups believe they face an existential threat for potable water. Fearing that future water shortages will not be isolated, the United Nations, the African Union, and the World Health Organization (WHO) will seek partnered innovation to solve the crisis.

Water shortage is not a third world problem. The 2012 UN World Water Development report states that "although water has never been the sole cause of a major war, it will emerge as

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[110] Department of Defense, 2011. *Report to Congress on Arctic Operations and the Northwest Passage* (May 2011), 13.

[111] "Warmer Water Speeds Melting of Antarctica Glaciers," *Wall Street Journal*, accessed December 8, 2014, http://www.wsj.com/articles/warmer-water-speeds-melting-of-antarctica-glaciers-study-says-1417719661.

[112] Ibid.

[113] *World Population 2012* (United Nations Department of Economic and Social Affairs Population Department, 2012), accessed November 25, 2014, http://www.un.org/en/development/desa/population/publications/pdf/trends/WPP2012_Wallchart.pdf.

[114] United Nations World Water Development Report 4. United Nations Educational, Scientific and Cultural Organization. "Managing Water Under Uncertainty and Risk", 2012, 7.

the single biggest contributing factor requiring nation to surge military might and innovative solutions."[115] Without modernizing current national military strategies, specifically in Antarctica, the United States will be ill postured to address both the supply of, and demand for, fresh water. Without a comprehensive strategy to address both supply and demand, the DoD response will be ad hoc, similar to the Ebola response in Western Africa in 2014.[116] The US and foreign medical workers leveraged the DoD's expeditionary capabilities to expand, improve, and sustain service to the African people. However, much like the DoD response to food shortages in Somalia in 1992, the DoD's response to water shortages will be increasingly contested as local and regional power brokers fight to control scarce resources. The disparity between supply and demand will require a comprehensive approach that both pacifies the violence associated with the "demand," as well as augments the lack of "supply" with external sources. Perhaps Antarctica finally emerges as the great reservoir for mankind's benefit by the opening of its fresh water reserves.

The international community will need to reevaluate the assumptions of the current Antarctic status quo as nations seek opportunities to profit from exploiting undefended fresh water resources. US policymakers must consider the plausible realities of 2060, reassess Antarctic priorities, and take action to better define and protect US national interests. The United States has an opportunity to prepare for 2060 by leading the world through change rather than reacting to a world in flux. Antiquated international agreements and outdated domestic policies currently impede the elements of national power from supporting Antarctic interests. The DoS, DoHS, NSF, and DoD must work together now and develop a comprehensive Antarctic strategy that leverages the collective strengths of each department and establishes a framework in which to address the problems of tomorrow. The Russians have adopted this method in the Arctic and,

[115] Ibid., 38.

[116] United States Agency for International Development, "West Africa - Ebola Outbreak," Ebola Fact Sheet #7, Fiscal Year 2015. (November 2014), 2.

while the United States plays catch up, there is an opportunity to seize the peace and begin proactive measures in Antarctica. This monograph concludes by offering four Lines of Effort (LOE) to begin modernizing current Antarctic strategies: (1) developing national interests in the Antarctic region, (2) reorganizing civilian-military structures and partnerships, (3) broadening ATS membership, and (4) expanding Antarctic infrastructure. The NSF and DoD, in conjunction with all current and future domestic Antarctic stakeholders, must provide a unifying vision and plan of action for securing US national interests in Antarctica.

LOE 1: Developing National Interests

The United States remains bound by the intellectual framework of 1961 and has yet to develop national interests in the Antarctic region independent of scientific inquiry. Due to the observance of Russian activity in the Arctic region, the preponderance of polar attention has been focused northward. In May of 2013, President Barack Obama released the National Strategy for the Arctic Region. It stated that "the Arctic is changing [and] we must proceed, cognizant of what we must do now, and consistent with our principles and goals for the future."[117] Six months later, the DoD released the Arctic Strategy, which emphasized that the DoD has a responsibility to ensure that the Arctic remains peaceful, stable, and free of conflict for future generations.[118] The Arctic Strategy lays out three main LOEs: advance US security interests, pursue responsible Arctic region stewardship, and strengthen international cooperation.[119] This approach postures the United States to achieve objectives outlined by the National Strategy for the Arctic Region while

[117] President Barrack Obama, "National Strategy for the Arctic Region," (May, 2013): ii.

[118] Department of Defense, "Arctic Strategy," (November, 2013): 1.

[119] Ibid., 3-4.

mitigating risks and overcoming challenges emerging from the growing geostrategic importance of the Arctic.[120] Antarctica is no different in this regard.

The United States has the opportunity for civilian and military leaders to modernize national interests by intellectually investing in Antarctica before changing conditions demand immediate action. A comprehensive Antarctic strategy begins with a "National Strategy for the Antarctic Region" from the President, enabled by an "Antarctic Strategy" from the DoD, supporting the NSF. The existing Arctic framework is readily transportable to the Antarctic. First of all, climate change will affect all water securities, to include the Southwest region of the United States, prompting an elevated national interest in current fresh water procurement and distribution strategies.[121] Antarctica offers a unique opportunity for American innovation and leadership to reduce fresh water scarcity on a regional and global scale. Second, by leading rather than reacting, the United States is more likely to establish a precedent of practices better ensuring responsible Antarctic region stewardship. Finally, a United States' led effort to address pending global water shortages for the mutual benefit of mankind compliments the principles of the Antarctic Treaty, the UN Charter, and the spirit of international cooperation. The United States must consider the vital role Antarctica could play in protecting US national interests and providing global leadership in a future operational environment continually shaped by climate change and water resource scarcity.

LOE 2: Reorganize Civilian-Military Structures and Partnerships

[120] Ibid., 14.

[121] Glen MacDonald, "Water, Climate Change, and Sustainability in the Southwest," *Proceedings of the National Academy of Sciences of the United States of America* 107, no. 50 (December 14, 2010): 21256, accessed February 21, 2015, http://www.pnas.org/cgi/doi/10.1073/pnas.0909651107.

Although the Antarctic Treaty prohibits any action of a military nature, there is much room for interpretation. The NSF, DoD, and DoHS should apply the Arctic model of interagency partnerships to better support scientific and security interests, ensure responsible Antarctic region stewardship, and strengthen international cooperation. This framework must be proactively adapted to the Antarctic operational environment in order to codify Antarctic priorities and synchronize coherent actions for the future. Two significant changes must occur to promote efficiencies across the whole of government and protect both science and security in a climate considered the harshest in the world. First, the DoD should introduce the idea of Departmentally Aligned Forces (DAF), in which a sub-unified command is formally subordinate to an agency other than DoD for a specified time and space. Second, the DoD must update the Unified Command Plan (UCP) to reassign Antarctica, Australia, and New Zealand to the US Southern Command (SOUTHCOM) (See Figure 3).

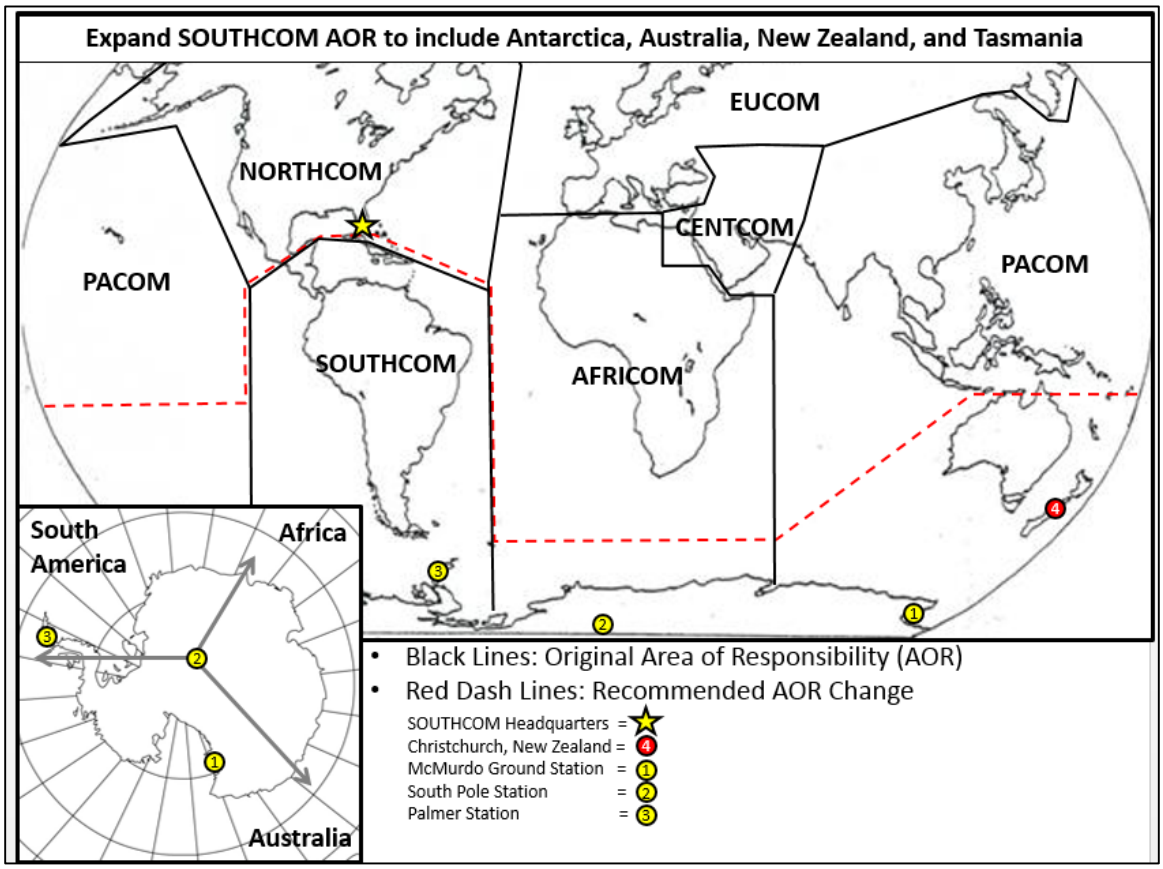

Figure 3. Recommend Changes to the Unified Command Plan

The UCP must be continually reassessed and restructured to support emerging challenges in the future operational environment. Antarctica currently resides in the PACOM area of responsibility (AOR), which is the largest of all Geographic Combatant Commands focused on ensuring vital US economic interests. The DoD "Pivot to the Pacific" was a response to the President's observation that military power seemed over-weighted in the Middle East and under-weighted in the Asia-Pacific.[122] In lieu of sending additional manpower to the PACOM AOR to rebalance force allocation, the AOR should be reduced by divesting the Antarctic region to SOUTHCOM. Antarctica's closest neighbors are Chile and Argentina, both original signatories of the Antarctic Treaty and located in the SOUTHCOM AOR.[123] Antarctica naturally fits into SOUTHCOM preexisting vision of "cooperation with domestic and international partners in order to foster security, ensure stability, and promote prosperity throughout Central and South America."[124] There is an opportunity for SOUTHCOM and the NSF to improve present programs and safeguard future operations through coordinated efforts amongst subordinate units. For example, the existing Joint Interagency Task Force South ([JIATF] South) could synchronize the combined efforts of US Army South (USARSOUTH), US Army Environmental Command (USAEC), and the USAP. Of note, USARSOUTH, USAEC, and USAP already maintain offices on or around Joint Base San Antonio, Texas. From these current locations, the NSF and DoD can develop modernized Antarctic strategies from a whole of government approach capable of

[122] "National Security Advisor Explains Asia-Pacific Pivot," Department of Defense, accessed February 9, 2015. http://www.defense.gov/News/newsarticle.aspx?ID=119505.

[123] "Area of Responsibility," US Southern Command, accessed February 4, 2015. http://www.southcom.mil/aboutus/Pages/Area-of-Responsibility.aspx.

[124] "Missions Main," US Southern Command, accessed February 4, 2015. http://www.southcom.mil/ourmissions/Pages/Our-Missions.aspx.

effectively and efficiently securing vital US national interests jeopardized by climate change, resource scarcity, or acts of aggression.

Although the logistical support provided by the JTF-SFA under Operation Deep Freeze is a universally accepted practice, the introduction of a possible land component may send the wrong signals to the international community. The 2014 Climate Change Adaptation Roadmap (CCAR) acknowledges the growing role that the DoD must play in future operational environments altered by scientifically accepted projections of climate change.[125] The idea of DAF allows the DoD to formally refocus military capabilities in support of scientific endeavors while mitigating fears of over-militarization in the Antarctic. The added military capabilities include increased means of search and rescue, logistics, expeditionary communications, and security. While current scientific operations prepare for weather-based security threats, increased Antarctic activity raises the need to prepare for violence-based security threats. In addition to SOUTHCOM's defense capabilities, their commitment to science and technology compliments the NSF's commitment to Antarctic development. SOUTHCOM regularly invests in technologies that enhance capabilities in the maritime domain, space-based communications, environmental and energy securities, and geospatial information sharing tools for disaster response.[126] Departmental affiliation would allow the DoD to support civilian organizations without characterizing their contributions as "military in nature." It is imperative that the DoD and Interagency partners seek new alternatives to meet emerging Antarctic challenges in a future operational environment where civilian-military partnerships are the norm and not the exception.

[125] Department of Defense, "Climate Change Adaptation Roadmap," Office of the Deputy Under Secretary of Defense for Installations and Environment (Science & Technology Directorate), (Alexandria, VA: 2014), 1.

[126] "Science, Technology and Experimentation," United States Southern Command, accessed March 07, 2015, http://www.southcom.mil/ourmissions/Pages/Science,-Technology-and-Experimentation.aspx.

LOE 3: Broaden ATS Membership

The United States must champion ATS membership expansion in order for it to remain a legitimate institution capable of arbitrating Antarctic disputes. The current membership practices are restrictive and create an exclusive culture. Exclusion is counterproductive to the ATS intent outlined in the Preamble of the Antarctic Treaty. If Antarctica is truly intended to benefit all mankind, then all states should have a voice when determining those interests. The DoS should launch initiatives to establish ATS membership requirements consistent with UN membership thereby enabling open participation in Antarctic affairs. Non-UN members, or states under current UN sanctions, would be barred from ATS participation until the UN repealed such sanctions. As the ATS grows, so does the legitimacy of the organization and the authority of their decisions. Understandably, expanded membership risks the overall efficiency and efficacy of the current system as nations tend to disagree on what constitutes a collective benefit. These concerns can be mitigated by establishing an Antarctic Legislature similar to the United States domestic processes. For example, the current consultative members would constitute an "Antarctic Senate" while the non-consultative members would constitute the "Antarctic Commons." All Antarctic resolutions would be subject to a majority vote by both houses and then accepted by the UN General Assembly. This system would allow all nations to contribute in Antarctic Affairs while still connecting political benefits to scientific commitments in the continent. Although this process is inherently bureaucratic and inefficient, the outputs would be more readily accepted on a wider scale by the global community. If a crisis like mass water shortages in Africa emerged, the ATS would be more likely perceived as a possible solution rather than a potential problem.

LOE 4: Expand Antarctic Infrastructure

The sustainability of all Antarctic initiatives are intimately tied to the current and future plans to expand Antarctic infrastructure. The NSF has accomplished much over the last 50 years in regards to updating the facilities at the MGS, ASPS, and the Palmer Station. However, more

needs to be done to mitigate the effects of weather and time while simultaneously preparing for increased activities. Since the first IGY in 1959, the military and scientific communities have worked closely to establish and sustain Antarctic infrastructure. Their continued partnership is a testament to the accomplishments of collaboration. Forums like the DoD-DoHS Capabilities Development Working Group could include NSF initiatives to address emerging infrastructure requirements in the Antarctic.[127] Defining operational requirements and identifying existing US Government, commercial, and international facilities could mitigate the high cost and extended timelines associated with infrastructure development.[128] The United States ability to project national power in Antarctica is limited by the capacity of existing infrastructure. Therefore expanding the lodgment capacity of the MGS should be the first priority. The MGS is uniquely postured to receive year round logistic via air or sea, which enables year round construction initiatives. In addition, the deep water port and relatively robust communications network offer an immediate opportunity for on-site collaboration by all Antarctic stakeholders. Although the costs associated with Antarctic infrastructure are high, lessons from the Arctic can and should be applied to promote efficiencies across both time and space.

Conclusion

As the climate changes regionally, Antarctica will likely emerge as a point of global emphasis. Contemporary geopolitical analyst, Robert Kaplan, has stated that "the environment is part of a terrifying array of problems defining a new threat to national security forcing foreign policy to emerge inexorably by need rather than by design."[129] The United States must assume a

[127] Department of Defense, "Strategy for Homeland Defense and Defense Support of Civil Authorities," Office of the Secretary of Defense, (February 2013), 23.

[128] *Climate Change Adaptation Roadmap*, 10.

[129] Robert Kaplan, "The Coming Anarchy," *The Atlantic* (February, 1994): 3, http://www.theatlantic.com/magazine/archive/1994/02/the-coming-anarchy/304670/3/.

proactive role in Antarctica's future, or risk becoming part of its past. Global population growth, natural resource scarcity, and ongoing climate change will alter Antarctica's operational environment, requiring national level civilian and military leadership to modernize US national strategies. The United States must account for Antarctica when considering enduring national interests. Antarctic pursuits may be costly and risk upsetting the international balance of power; but where there is risk, there is also opportunity. The United States must modernize strategic objectives in Antarctica and reallocate departmental responsibilities in order to establish a position of relative advantage in a region vital to US national interests. From 1820-1961, the United States led the way in Antarctica, developing a framework for international peace in the southernmost region of the world. However, the framework established in 1961 is no longer suited for the contemporary operational environment, nor does it account for increased Antarctic interest driven by emerging global trends.

> It would behoove us, however, to make a very thorough review of the US future objectives vis-à-vis the Antarctic and make a clear appraisal of how to reach those objectives most efficiently. This study should be undertaken by those who are most experienced in the field, in conjunction with those who have a broad concept of all our national objectives, rather than by those with limited knowledge of conditions and possibilities. Nor should the scope of future objectives be limited entirely to the scientific approach. We have many other legitimate national interests in the Antarctic.
>
> -Finn Ronne, Captain, USNR, Antarctic Command, 1961[130]

[130] Finn Ronne, *Antarctic Command,* (New York: Bobbs-Merrill, 1961), 250.

Appendix
Antarctic Countries and Commitments

	Antarctic Treaty System Members			Antarctic Agreements			Memberships				Capability
	Country Name * Denotes Claim	**Treaty Enters into Force**	**Consultative Status**	**Environment Protocol**	**CCAS**	**CCAMLR**	**NATO**	**BRICS**	**G8**	**G77**	**Ice Breakers**
CONSULTATIVE MEMBERS (Original Signatories Shaded)	Argentina*	23-Jun-61	23-Jun-61	14-Jan-98	Y	Y				Y	1/0/0
	Australia*	23-Jun-61	23-Jun-61	14-Jan-98	Y	Y					1/0/0
	Belgium	23-Jun-61	23-Jun-61	14-Jan-98	Y	Y	1949				
	Brazil	16-May-75	27-Sep-83	14-Jan-98	Y	Y		Y		Y	
	Bulgaria	11-Sep-78	5-Jun-98	21-May-98		Y	2004				
	Chile*	23-Jun-61	23-Jun-61	14-Jan-98	Y	Y				Y	1/0/0
	China	8-Jun-83	7-Oct-85	14-Jan-98		Y		Y		Y	1/0/1
	Czech Rep	14-Jun-62	1-Apr-14	24-Sep-04			1999				
	Ecuador	15-Sep-87	19-Nov-90	14-Jan-98						Y	
	Finland	15-May-84	20-Oct-89	14-Jan-98		Y					7/0/1
	France*	23-Jun-61	23-Jun-61	14-Jan-98	Y	Y	1949		Y		
	Germany	5-Feb-79	3-Mar-81	14-Jan-98	Y	Y	1955		Y		1/0/1
	India	19-Aug-83	12-Sep-83	14-Jan-98		Y		Y	Y		
	Italy	18-Mar-81	5-Oct-87	14-Jan-98	Y	Y	1949		Y		
	Japan	23-Jun-61	23-Jun-61	14-Jan-98	Y	Y			Y		1/0/0
	Korea (ROK)	28-Nov-86	9-Oct-89	14-Jan-98		Y					1/0/0
	Netherlands	30-Mar-67	19-Nov-90	14-Jan-98		Y	1949				
	New Zealand*	23-Jun-61	23-Jun-61	14-Jan-98		Y					
	Norway*	23-Jun-61	23-Jun-61	14-Jan-98	Y	Y	1949				1/0/1
	Peru	10-Apr-81	9-Oct-89	14-Jan-98		Y				Y	
	Poland	23-Jun-61	29-Jul-77	14-Jan-98	Y	Y	1999				
	Russia	23-Jun-61	23-Jun-61	14-Jan-98	Y	Y		Y	Y		40/6/5
	South Africa	23-Jun-61	23-Jun-61	14-Jan-98	Y	Y		Y		Y	1/0/0
	Spain	31-Mar-82	21-Sep-88	14-Jan-98		Y	1982				
	Sweden	24-Apr-84	21-Sep-88	14-Jan-98		Y					6/0/0
	Ukraine	28-Oct-92	4-Jun-04	24-Jun-01		Y					
	United Kingdom*	23-Jun-61	23-Jun-61	14-Jan-98	Y	Y	1949		Y		0/0/1
	United States	23-Jun-61	23-Jun-61	14-Jan-98	Y	Y	1949		Y		5/0/1
	Uruguay	11-Jan-80	7-Oct-85	14-Jan-98		Y				Y	
	Country	**Entry into force**	**Consultative Status**	**EP**	**CCAS**	**CCAMLR**	**NATO**	**BRICS**	**G8**	**G77**	**Ice Breakers**
NON CONSULTATIVE MEMBERS	Austria	25-Aug-87	-								
	Belarus	27-Dec-06	-	15-Aug-08							
	Canada	4-May-88	-	13-Dec-03	Y	Y	1949		Y		6/0/1
	Colombia	31-Jan-89	-						Y		
	Cuba	16-Aug-84	-							Y	
	Denmark	20-May-65	-				1949				4/0/0/
	Estonia	17-May-01	-				2004				2/0/0
	Greece	8-Jan-87	-	14-Jan-98		Y	1952				
	Guatemala	31-Jul-91	-							Y	
	Hungary	27-Jan-84	-				1999				
	Korea (DPRK)	21-Jan-87	-							Y	
	Malaysia	31-Oct-11	-							Y	
	Monaco	31-May-08	-	31-Jul-09						Y	
	Pakistan	1-Mar-12	-	31-Mar-12		Y				Y	
	Papua N. Guinea	16-Mar-81	-							Y	
	Portugal	29-Jan-10	-	10-Oct-14			1949				
	Romania	15-Sep-71	-	5-Mar-03			2004				
	Slovak Republic	1-Jan-93	-				2004				
	Switzerland	15-Nov-90	-								
	Turkey	24-Jan-96	-				1952				
	Venezuela	24-Mar-99	-	31-Aug-14						Y	

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